

**Modification 001
Task Agreement P13AC00907
Against
Cooperative Agreement
P09AC00212
between
The United States Department of the Interior
National Park Service
and
Rutgers University**

.....

Project Title: Impacts of Superstorm Sandy: Mapping and Quantification of Geomorphological Change GATE, FIIS, ASIS/Addendum Title: **Collection of High Resolution Topographical Data and Development of Metrics Associated with Superstorm Sandy Impacts, Recovery, and Coastal Geomorphological Resiliency, Gateway NRA**

CFDA: 15.945, Cooperative Research and Training Programs – Resources of the National Park System (CESU)

GENERAL: The purpose of this modification is to:

- a) Amend Article III-Statement of Work by adding Attachments A and B
- b) Amend Article VI to add funds in FY2014 in accordance with the proposal in Attachment A.
- c) Amend Article IX to add deliverables including data and reports in accordance with Attachment A.
- d) Amend Article XIII by adding Attachments A and B.

ARTICLE III – STATEMENT OF WORK

- A. Rutgers University agrees to implement the attached study proposal/work plan (ATTACHMENT A).
- B. The NPS agrees to the tasks presented in ATTACHMENT B.

ARTICLE VI – AWARD AND PAYMENT

- A. Financial Assistance: NPS will provide funding to the Rutgers University in an amount not to exceed **\$161,873** in fiscal year 2014 for the work described in Article III and in accordance

with the approved budget. Any award beyond the current fiscal year is subject to availability of funds.

FY13-Under Task Agreement P13AC00907

FY 2013 --\$253,310

FY14 Appropriation Data: The chargeable appropriation for this Modification is:

FY14 \$161,873

WBS: PX.P0201795A.00.1 FA: PAN00AN61.XZ0000

Fund: 13XP010261 CC: PPNEFIIS00

Total funds awarded to date under this task agreement: \$415,183

ARTICLE IX – REPORTS AND/OR DELIVERABLES:

A. Specific Deliverables

The list of project deliverables and due dates for this Modification include:

1. Annual data reports on the short-term evolution of the shoreline, beach and dune systems at Gateway NRA, will be developed and these data will be added to the existing dataset of long-term trends being developed by the NPS. Annual reports due June 30, 2015 and June 30, 2016.
2. All data presented in a geodatabase format and associated metadata for GPS shoreline, topographical profile data, and NPS requested salt marsh elevation data for areas identified in attached scope of work for Gateway NRA. Due June 30, 2016.
3. Analysis of the shoreline and beach/dune profile data collected as part of this project, in relation to pre-Hurricane Sandy data collected for Gateway NRA will be evaluated on a site by site basis, and a report will be developed evaluating the changes that have occurred to the beach/dune systems of Gateway NRA pre-and post- storm. A report will be generated that will describe the changes that occurred as a result of the storm, based on this analysis, the potential future changes that may occur following major storms and hurricanes and management implications and recommendations to the park. Draft report-June 30, 2016/Final report-September 1, 2016.

ARTICLE XIII – ATTACHMENTS

The following documents are attached and made part of this Task Agreement:

- A. Rutgers University study proposal and budget, addendum titled: “Collection of High-Resolution Topographical Data and Development of Metrics Associated with Superstorm Sandy Impacts, Recovery, and Coastal Geomorphological Resiliency, Gateway NRA”
- B. Tasks that the National Park Service agrees to perform.

All other terms and conditions remain unchanged.

ARTICLE XIV – SIGNATURES

IN WITNESS WHEREOF, the parties hereto have executed this Task Agreement on the date(s) set forth below:

FOR RUTGERS UNIVERSITY:

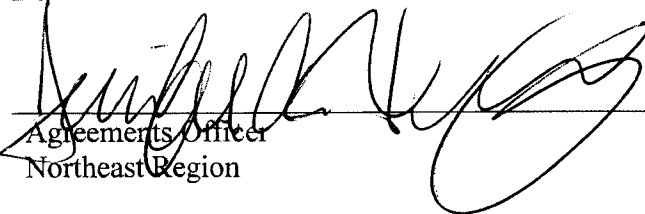


Casandra Burrows
Asst Director - ORSP



Date

FOR THE NATIONAL PARK SERVICE



Agreements Officer
Northeast Region



Date

ATTACHMENT A: Rutgers University Study Proposal



Office of Research and Sponsored Programs
Rutgers, The State University of New Jersey
3 Rutgers Plaza . New Brunswick . New Jersey 08901
732/932-0150 . FAX: 732/932-0162/3 . Web Site: <http://orsp.rutgers.edu>

Original Task Agreement Title:

IMPACTS OF SUPERSTORM SANDY: MAPPING AND QUANTIFICATION OF GEOMORPHOLOGICAL
CHANGE GATE, FIIS, ASIS

Modification Title:

COLLECTION OF HIGH RESOLUTION TOPOGRAPHICAL DATA AND DEVELOPMENT OF METRICS
ASSOCIATED WITH SUPERSTORM SANDY IMPACTS, RECOVERY, AND COASTAL
GEOMORPHOLOGICAL RESILIENCY, GATEWAY NRA

Submitted to: Sara Stevens, Director, Northeast Coastal and Barrier Network,
National Park Service

Submitted By: Norbert P. Psuty, Co-Principal Investigator
Michael P. DeLuca, Co-Principal Investigator
Institute of Marine and Coastal Sciences
Rutgers University

Co-Investigators:

Dr. Norbert P. Psuty, Professor Emeritus Institute of Marine and Coastal Sciences Rutgers University 74 Magruder Road Sandy Hook, New Jersey 07732 732-708-1462 732-238-1443 psuty@marine.rutgers.edu	Michael P. DeLuca Senior Associate Director Institute of Marine and Coastal Sciences Rutgers University 71 Dudley Road New Brunswick, New Jersey 08901 (848) 932-3474 deluca@marine.rutgers.edu
--	---

Background

The focus for this activity is Gateway National Recreation Area, incorporating the Sandy Hook Unit (northern coastal New Jersey), Great Kills Park, Miller Field, and Fort Wadsworth in the Staten Island Unit of Gateway (the ocean-facing coast of Staten Island), and Plumb Beach, Breezy Point, Fort Tilden, and Riis Park in the ocean-facing

portion of the Jamaica Bay Unit of Gateway (Fig. 1). This project is part of a larger effort to collect high resolution topographical data to support National Parks directly impacted by Superstorm Sandy with mitigation and resiliency planning. All of the coastal and near coastal communities in this densely-developed urban area are part of an on-going monitoring program conducted by the National Park Service. Enhanced efforts in data collection of high resolution topographical data, will offer key information to assess the general resilience to the evolving environmental changes caused by the impacts of Superstorm Sandy.

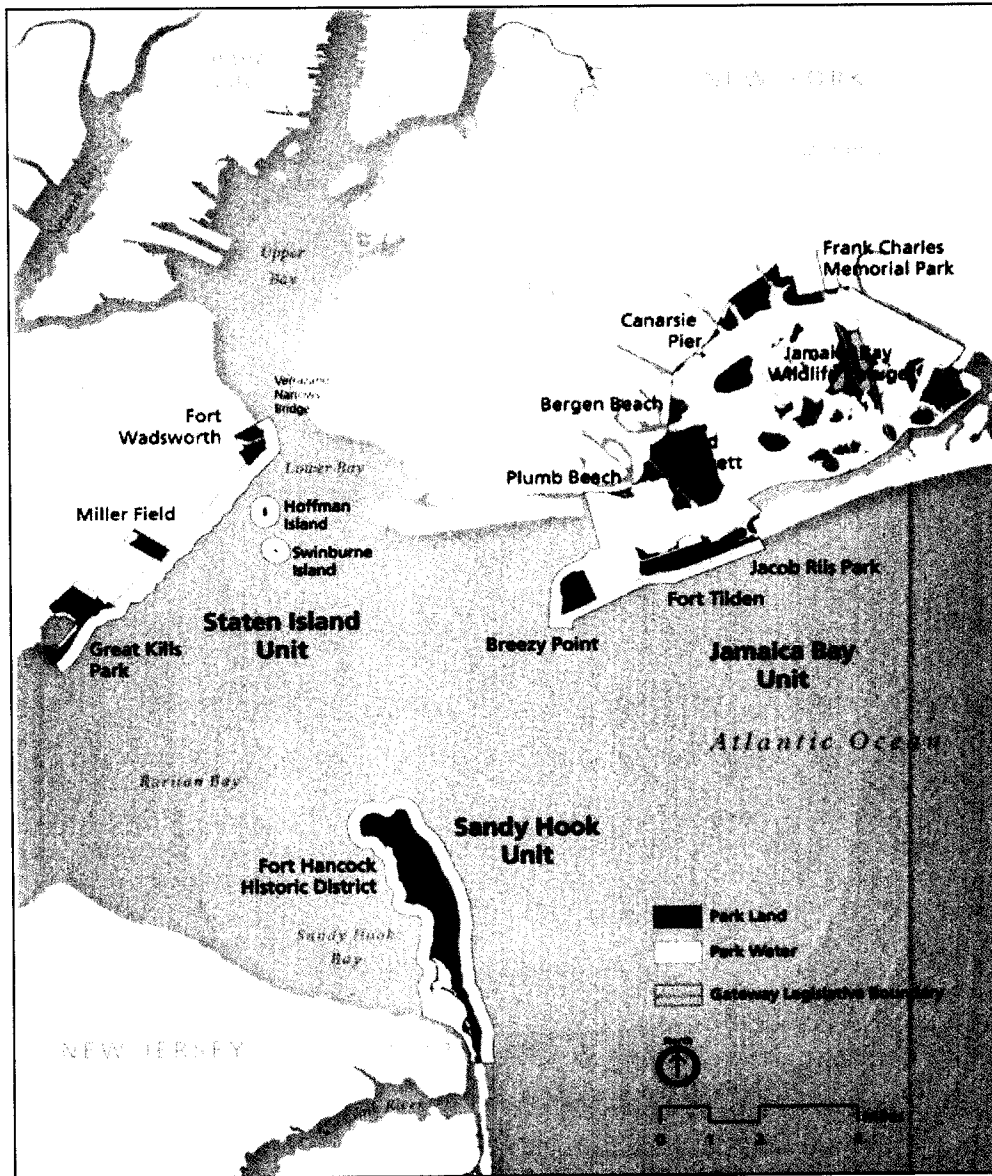


Figure 1. Location of Sandy Hook Unit, Staten Island Unit, and Jamaica Bay Unit within Gateway National Recreation Area.

Project Goals:

This project will assess the recovery of coastal geomorphological systems at Gateway NRA following the impacts of Superstorm Sandy, through the collection of survey-grade topographical data and modeling of both the impacts and the post-storm system recovery. This project will enable better understanding and an improved means to evaluate the effectiveness of the natural

recovery and geomorphological quality and resilience of the ambient conditions at the sites (Feagin 2013). Geomorphological data exist to characterize the sites prior to Superstorm Sandy. They will form one of the means to evaluate the natural strategies emplaced. Importantly, the vectors of recovery determined as a result of this project will be key to determine the efficacy of NPS management decisions in both the short-term as well as maintaining the longer-term evolution of the system. An important element in the landscape is the position of the shoreline at a site as well as compared to updrift and downdrift locations. The spatial vectors of change in shoreline position will be developed and compared relative to Superstorm Sandy. Coastal dunes are also a very important component of the coastal system (Martinez and Psuty 2004). They create a unique habitat at the interface of the marine and terrestrial environments that are used by highly specialized plants and animals (many on Threatened & Endangered lists). The dunes also form a natural buffer to storm surge and coastal erosion, thereby offering a level of protection to the habitats and the inhabitants located inland. Thus, another goal of this project will be to evaluate the coastal dune systems at each of the park sites independently, and provide key management information for each site regarding the functioning and vectors of resilience of that coastal geomorphological system.

Critical to any attempt to evaluate is the establishment of a rigorous data collection and monitoring of the variables, especially shoreline position (Theiler et al. 2009) and the dune form and evolution during the restoration process (Doody 2013; Psuty and Silveira 2013)). Fortunately, the coastal Units of Gateway NRA were locations of beach and foredune monitoring as part of a regional NPS program of data collection following a rigorous methodology developed by Psuty et al. (2010; 2012a), and in reports recently submitted to the NPS (Psuty et al. 2012b; Psuty et al., 2013). This project will add Fall 2014, Spring 2015, Fall 2015, and Spring 2016 to the data sets and expand the trend analyses accordingly.

Methodology

The geomorphological evolution of the beach and dune features will be tracked via precision surveys using very high resolution geodetic GIS survey equipment in the real time kinematic (RTK) survey style. This is the same means of profile and Digital Elevation Model development prescribed in Psuty et al. (2012) for tracking coastal change. The surveys will be repeated on a prescribed interval to establish the dimensions and spatial assemblage of storm recovery. Fortunately, periodic surveys over the past several years have established a baseline of comparison relative to shoreline position and dimension of the beach/dune profile. They will serve as a guide to compare the metrics of recovery.

Overall, the shoreline position change and the beach/dune profile changes will be analyzed to assess the geotemporal patterns of recovery, incorporating the dimensional evolution of the feature (Psuty et al. 2014). Vectors of change will be calculated and related to the driving variables in the local environment.

Outcomes/Goals

1. A primary goal will be to monitor the post-Sandy evolution of the shoreline and dune/beach profiles with metrics quantifying the dimensions and locations of the changes through Spring 2016.
2. The post-Sandy features will be compared to the pre-Sandy morphology and its

trajectory of evolution will be tracked.

3. The recovered shoreline and beach/dune profiles will be evaluated on a site by site basis.
4. Data Reports on the short-term evolution of the shoreline, beach and dune systems at Gateway NRA, will be developed and these data will be added to the existing dataset of long-term trends being developed by the NPS.
5. Products developed as part of this project will be presented to the NPS as well as presented at a professional scientific conference either as a presentation or poster.

Products and Schedule of Dates

1. Annual data reports on the short-term evolution of the shoreline, beach and dune systems at Gateway NRA, will be developed and these data will be added to the existing dataset of long-term trends being developed by the NPS. Annual reports are due June 30, 2015 and June 30, 2016.
2. All data presented in a geodatabase format and associated metadata for GPS shoreline, topographical profile data, and NPS requested salt marsh elevation data for areas identified in attached scope of work for Gateway NRA. Due June 30, 2016.
3. Analysis of the shoreline and beach/dune profile data collected as part of this project, in relation to pre-Hurricane Sandy data collected for Gateway NRA will be evaluated on a site by site basis, and a report will be developed evaluating the changes that have occurred to the beach/dune systems of Gateway NRA pre-and post- storm. A report will be generated that will describe the changes that occurred as a result of the storm, based on this analysis, the potential future changes that may occur following major storms and hurricanes and management implications and recommendations to the park. Draft report-June 30, 2016/Final report-September 1, 2016.

References

- Doody, J.P., 2013. *Sand Dune Conservation, Management and Restoration*. Springer: Berlin, 303 p.
- Feagin, R., 2013. Foredune Restoration Before and After Hurricanes: Inevitable Destruction, Certain Reconstruction. In: Martinez, M. L., J. B. Gallego-Fernandez, and P. A. Hesp, Eds, *Restoration of Coastal Dunes*. Springer: Berlin, 93-103.
- Martinez, M.L., and N.P. Psuty, Eds, 2004. *Coastal Dunes: Ecology and Conservation*. Springer: Berlin, 386 p.
- Psuty, N.P., and T.M. Silveira, 2013. Restoration of Coastal Foredunes, A Geomorphological Perspective: Examples from New York and from New Jersey, USA. In: Martinez, M.L., J.B. Gallego-Fernandez, and P.A. Hesp, Eds. *Restoration of Coastal Dunes*. Springer: Berlin, 33-48.
- Psuty, N.P., M. Duffy, J F. Pace, D.E. Skidde, and T.M. Silveira. 2010. *Northeast Coastal and Barrier Network geomorphological monitoring protocol: part I—ocean shoreline position*. Natural Resource Report NPS/NCBN/NRR —2010/185. National Park Service, Fort Collins, Colorado, 146 p.
- Psuty, N.P., T.M Silveira, A. Spahn, and D. Skidde, 2012a. *Northeast Coastal and Barrier Network Geomorphological Monitoring Protocol: Part II – Coastal Topography*. Natural Resource Report NPS/NCBN/NRR —2012/591. National Park Service, Fort Collins, Colorado, 162 p.
- Psuty, N.P., W. Schmelz, A. Spahn, September 2012b. *Coastal Profile Changes, Gateway National Recreation Area: Annual Monitoring Report, 2010-2011 (DRAFT)*. Submitted to the Northeast Coastal and Barrier Network, National Park Service, 54 p.

- Psuty, N.P., W. Schmelz, A. Spahn, C. Carvajal. September 2013. *Coastal Profile Changes, Gateway National Recreation Area: Annual Monitoring Report, 2011-2012* (DRAFT). Submitted to the Northeast Coastal and Barrier Network, National Park Service, 56 p.
- Psuty, N.P., A. Spahn, T.M. Silveira, and W. Schmelz, 2014. Sediment Budget as a Driver for Sediment Management at Plumb Beach, New York, USA: Vectors of Change and Impacts. *Journal of Coastal Conservation and Management* 18, in press,
- Thieler, E.R., E.A. Himmelstoss, J.L. Zichichi, and A. Ergul. 2009. Digital Shoreline Analysis System (DSAS) version 4.0—An ArcGIS extension for calculating shoreline change: U.S. Geological Survey Open-File Report 2008-1278. Available online at: <http://pubs.usgs.gov/of/2008/1278/>.

BUDGET

Item	Yr 1	Yr 2		Total
Personnel				
Norbert P. Psuty – Project Leader	5,000	6,000		11,000
Andrea Spahn (Research Assistant) – project coordinator, technical support on data collection and training for expanded field surveying	6,000	3,000		9,000
Research Assistant	31,000	32,000		63,000
Student Hourly wages, technical support with DSAS	6000	3,000		9,000
Fringe on wages	17,120	16,092		33,212
Total Personnel	65,120	60,092		125,212
Computer supplies	150	100		250
Computer software	2,000	1,700		3,700
Project supplies	400	500		900
Travel – Domestic	2,000	3,000		5,000
Conference registration	500	500		1,000
Housing	500	500		1,000
Equipment	500	500		1,000
Direct Costs	\$71,170	68,692		138,062
Indirect Costs (17.5%) (Excludes Housing/Equipment Costs)	\$12,280	11,531		23,811
Total Funding Requested	\$83,450	78,423		161,873

BUDGET JUSTIFICATION

Personnel – Costs in the proposed budget are funds for:

1. Dr. Norbert P. Psuty, Coastal Geomorphologist , Professor Emeritus , Rutgers University. He has been studying coastal change in Gateway for decades and has written the protocols for coastal monitoring in the area. He will be the senior scientist on evaluating the outcomes and directing the conceptual basis of the effort
2. Andrea Spahn, project organization, GIS Coordinator, IMCS Rutgers. She has been conducting GPS surveys and managing the data sets in the area for over five years.
3. Research Assistant, to conduct the monitoring surveys, data QA/QC, and data organization.
4. Student hourly wages, to assist in field data collection

Supplies - Funds are provided for supplies to cover office needs, and upgrading and maintenance of computer and leasing of computer software.

Travel - Funds are provided for travel to the several park Units, to meetings with NCBN leadership,

and to communicate the products of the monitoring of recovery and resilience efforts in scientific and resource management venues.

Housing Costs –space for interns at Sandy Hook complex

Repair and Maintenance – upkeep of survey equipment.

Indirect Cost -- In accordance with the North Atlantic Coast CESU cooperative agreement with the National Park Service and the Rutgers University, the indirect cost rate is 17.5%.

Total funds requested (including indirect costs) are \$161,873

ATTACHMENT B

The NATIONAL PARK SERVICE agrees to:

- Assign the Northeast Coastal and Barrier Network (NCBN) Program Manager as the Science Technical Advisor on this project. The Project Manager and the NCBN Data Manager will collaborate with Rutgers's investigator, research associates, graduate students and under graduate interns on the project priorities, design, data management, data interpretation, and production of final deliverables including data formats.
- Assist in training Rutgers's staff on the use of RTK GPS and Total Station elevation data collection.
- Loan high accuracy GPS equipment as needed for the life of this project.
- Participate with the Cooperators in workshops, park staff meetings and other forums to establish annual work tasks and priorities;
- Provide the cooperator with all existing park shoreline monitoring data collected as part of the NCBN I&M Program, including any LiDAR data, spatial data, reports, publications, and databases as required;
- Provide Northeast Coastal and Barrier Network personnel time to evaluate work in progress, consult with the Cooperator, assist with database development, mapping and assist in data collection in the field as needed;
- Assist in the training of graduate or undergraduate students or other Rutgers University personnel engaged in this monitoring project funded by the NPS.
- Provide and encourage Rutgers University personnel access to and use of the natural and cultural resources of units of the National Park System for the purpose of conducting appropriate research, monitoring, and educational activities, except for those activities which may conflict with the values and purposes of the area as stated in federal law or policy.
- When available, provide logistical support to facilitate monitoring activities at FIIS, GATE and ASIS.
- Provide necessary NPS permits (e.g., collecting permits, research permits, special use permits), subject to park approval, for work conducted within a national park.
- Provide financial assistance as outlined in Article VI.